

$$\frac{d}{dt} \left(\int_{\Omega} u^2 dx + \int_{\Gamma} u^2 dS \right) = -2 \int_{\Omega} u \Delta u dx - 2 \int_{\Gamma} u \nabla_n u dS$$
$$\frac{d}{dt} \left(\int_{\Omega} u^2 dx + \int_{\Gamma} u^2 dS \right) = -2 \int_{\Omega} u \Delta u dx - 2 \int_{\Gamma} u \nabla_T u \cdot \nu dS$$